

STAT

Recent Development of Reichsbahn Signalling

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RECENT DEVELOPMENT OF REICHBAHN SIGNALLING

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S-Bahn [rapid transit railway in Berlin] Signals: In order to make possible a short headway between trains on the S-Bahn the signal blocks are very short, so that the advance signal for one block has the same location as the main signal for the block before. These advance signals have been consolidated with the main signals on a single board. These signals have been designated Sv signals or connecting signals. The main signal is always on the left of the board and the advance signal on the right. Stop is indicated by a red light, whether in connection with entrance or exist signals dependent on switches or in connection with block signals. If the main signal is out of order, an emergency signal operated by the dispatcher is used. The stop signal at a block shows as its signal Sv 3 at the present time two yellow lights. After coming to a stop on this signal, the train may proceed with special caution upon the verbal orders of the conductor. This type of stop is known as a permissive stop. In accordance with the significance of the signal colors it seems to be more logical to eliminate the two yellow lights, using a red light and a yellow light instead. Two green lights horizontally adjacent to each other -- signal Sv 1 -- means "proceed, expect proceed at next signal". A green light at the left and a yellow light at the right mean "proceed, expect stop at next signal". (The

main signal is at the left, the advance signal at the right). In the signals Sv 5 to Sv 8 of the signal book, reduced speed for the block in question and the next block is indicated by two green lights arranged vertically. Conforming to the proposed change of the same signaling on normal railroad signals it would also be more logical here to have a green light with a yellow light under it indicate reduced speed. To rearrange the Sv-signals in this way should present no particular difficulties. A proposal for the new signaling code for the Sv-signals is shown in Figure 8.

Number	Meaning of Signal	Appearance of Signal	Remarks
1	Stop	⊖	Absolute stop at signals dependent on switches
2	Come to stop, proceed further by visual contact	⊖ ⊗	At block signals (Previously 2 yellow lights)
3	Go	⊗ ⊗	
4	Go -- Next signal is set at stop	⊗ ⊗	
5	Slow	⊗ ⊗	
6	Slow -- next signal is set at stop	⊗ ⊗	
7	Slow -- next signal is set at slow	⊗ ⊗	
8	Go -- next signal is set at slow	⊗ ⊗	
9	Reduced distance to next signal	⊗ ↓	

Figure 8      Meaning and appearance of signals on the  
Sv-signal system on the S-Bahn

Train Operated Signals on Main Lines: In connection with the equipping of main lines with automatic block signals, it appears likely that train operated signals will also be installed on these lines. It does not, however, seem advisable to install on such lines the same type of Sv-signals as used on the S-Bahn, since main lines and S-Bahn lines often run along the same right of way for considerable distances and it is necessary for operating reasons to distinguish clearly between the signals of the two lines.

Train controlled signals on main lines, abbreviated as Sv-signals, are located at the beginning of each block. They do not have special advance signals. The distance between signals should run between 1500 and 1700 meters.

The following symbols are proposed for the signalling of the various types of signalized instructions:

1. One green light = go; at least the two blocks ahead  
are clear.
2. Two yellow lights, in vertical arrangement to distinguish from an advance signal  
= go; expect "stop" at next signal.
3. One red light = stop.

On yard entry and exit signals dependent on switches as well as on covering signals, the red light indicates absolute stop as it does on all other signals. In order to permit passage past an entry or exit signal which is out of order, an

emergency signal must be given by the dispatcher. In the case of block signals, on the other hand, when the automatic signalling mechanism is out of order and the train is faced with a stop signal, the conductor must give the engineer a written order to proceed further by visual contact. This operating method with the so-called permissive stop has been used on foreign railways and also on the S-Bahn for many years with good results, so that there should be no misgivings about introducing it on our main lines. The permissive stop is indicated by a red and a yellow light in vertical order. It is also conceivable that the block signals might be equipped with emergency signals which would be operated by remote control from a central point by an open-line dispatcher. This solution requires, however, heavy expenditure for technical equipment.

On mountainous lines it is not desirable that trains should stop at block signals which are out of order, since it is in this case difficult to start the train again and there is also danger of coupling breaks resulting in loose cars. At such signals it is most feasible to have the train pass the signal and proceed cautiously without stopping. Such a stop signal can be designated by two extra yellow lights in addition to the red light. The prescribed signals will be used to indicate the condition of the line. In case of lines branching off, it is also necessary to indicate additionally the need for slowing down. For this purpose -- in conformity with its general operative meaning -- yellow lights are appropriate. It is proposed that a fixed yellow light be used as advance warning to slow, and that the beginning of the reduced speed zone be indicated by a flashing yellow light. To exchange the meaning of

these two signals [so that the blinker would be the advance warning and the fixed light the beginning of the slow zone] is also to be considered.

A synopsis of the various signals heretofore proposed for use on train controlled main line signals is given Figure 9.

Number	Meaning of Signal	Appearance of Signal	Remarks
1	Stop	⊙	Absolute stop at signals dependent on switches and at covering signals
2	Emergency signal to proceed	⊙ ⊗	
3	Come to a stop; proceed further by visual contact	⊙ ⊗	At block signals
4	Proceed slowly by visual contact without stopping	⊙ ⊗ ⊗	At signals on mountainous lines
5	Warning -- stop at next signal	⊗ ⊗	) Reduced distance to next signal indicated by additional white light.
6	Go	⊙	
7	Prepare to slow down	⊗ ⊗	
8	Slow	⊗ ⊗	Fixed yellow light - advance slow signal Flashing yellow light = beginning of slow zone
9	Slow -- stop at next signal	⊗ ⊗	
10	Slow -- continue slow at next signal	⊗ ⊗	

Figure 9 Meanings and appearance of signals on train controlled signals of main lines

The entry and exit signals on through main tracks at stations

may be set for through operation, in which case they are activated by trains. Or, in case trains are to be routed into the yard tracks, they may be switched to hand operation.

Train traffic on main lines is different from traffic on the S-Bahn. In the latter case there are trains of only one category moving at the same speed, whereas the main lines usually carry ~~a number of~~ <sup>various</sup> kinds of trains including express and local passenger trains and freight trains. Determining the most advantageous distance between block signals is therefore a much more difficult problem on the main lines than on the S-Bahn.

If, for instance, the distance between signals is determined with reference to fast trains, it may be unfavorable for freight trains, since the long traveling time between blocks may cause the engineer of a freight train to forget the last advance signal. If cab signals are used, that is an indicator in the cab showing the engineer the position of the signal toward which he is moving, the distance between signals loses its importance. This type of signaling is therefore ideal. Its application is a question of expense and economy.

In the approaches to stations the signal blocks may be reduced to half their usual length in order to permit successive trains to follow each other closely. To indicate a short block the signal has an extra white light.

In the application of train operated signals the speed of the trains is not the only deciding factor. More important is the headway between trains. By using train operated signals and increasing the number of blocks it is possible to increase

appreciably the capacity of a line and avoid constructing extra tracks. Before undertaking to plan expanding the number of tracks in a line, it should be thoroughly investigated whether or not the installation of new signal and block equipment for the existing tracks would also accomplish the desired purpose efficiently.

#### Concluding Remarks

A good deal of preliminary work has already been done towards an efficient and modern arrangement of light signals. The continuance and conclusion of this work depend in the main on the determination of the system to be used in signaling with lights by the authorities competent to make such a decision. Proposals to this end have already been submitted to the authorities by the Block and Switch Control Committee with the collaboration of the Operating Mechanical Service. May the preceding contribution be a further milestone toward the realization of this goal.

#### ----- Correction

In the article "Further Development of Signals on the Reichsbahn," in "Der Verkehr," No. 9, page 280, column 2, next to last section, line 3 should read correctly: (Zv 3 is  
= yellow-yellow-green).